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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,938	09/09/2003	James Robert Champion	FOM-139.01	1614
25181	7590	06/01/2005		
FOLEY HOAG, LLP PATENT GROUP, WORLD TRADE CENTER WEST 155 SEAPORT BLVD BOSTON, MA 02110			EXAMINER BENSON, WALTER	
			ART UNIT	PAPER NUMBER
			2858	

DATE MAILED: 06/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/657,938	CHAMPION ET AL.	
	Examiner	Art Unit	
	Walter Benson	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 11 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-7, 9-19 and 21-29 is/are rejected.
- 7) ☒ Claim(s) 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/29/04; 4/11/05</u> | 6) <input type="checkbox"/> Other: _____  |

**FINAL ACTION**

1. Amendment A, received on 4/11/05, has been entered into record. Claim 8 has been cancelled.

2. Claims 1-7, and 9-29 are now pending.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2-4, 6-7, 9 15, 23-25, and 27 rejected under 35 U.S.C. 103(a) as being unpatentable over Resnick (US Patent No. 5,910,188 and Resnick hereinafter) in view of Blaine (US Patent No. 6,023,970 and Blaine hereinafter).

5. As to claims 1 and 23, Resnick discloses a system substantially as claimed, comprising:  
at least one first conductive element and at least one second conductive element so disposed with respect to each other that, when the first and second conductive elements extend through a dielectric mismatch boundary, a first electromagnetic signal will induce a-second

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electromagnetic signal to propagate along the second conductive element (col. 2; lines 64-67 and col. 3, lines 1-8);

Resnick did not expressly disclose:

a transmitter operable to drive the first electromagnetic signal along the at least one first conductive element without also driving the at least one second conductive element;

a receiver for receiving the second electromagnetic signal from the at least one second conductive element being coupled to the at least one second conductive element in response to the at least one dielectric mismatch boundary.

Nonetheless, these features are well known in the art and would have been an obvious modification of the system disclosed by Resnick, as evidenced by Blaine.

Blaine discloses a fluid level sensor for determining the level of fluid in a container having:

a transmitter [col. 8, lines 2-5] operable to drive the first electromagnetic signal along the at least one first conductive element without also driving the at least one second conductive element (col. 9, lines 58-60 and col. 11, lines 32-35);

a receiver [col. 12, lines 19-22] for receiving the second electromagnetic signal from the at least one second conductive element being coupled to the at least one second conductive element in response to the at least one dielectric mismatch boundary (col. 12, lines 10-16).

Given the teaching of Blaine, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Resnick by employing the well known or standard features of a sensor, such as disclosed by Blaine in order to improve the measuring sensitivity and accuracy of the sensor.

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6. As to claims 2 and 24, Resnick discloses a system further comprising:  
a third conductive element surrounding at least part of the at least one first and second conductive elements and being connected to a ground plane (36, Fig. 4; col. 4, lines 38-45).
7. As to claim 3, Resnick discloses a system comprising  
where the at least one first and second conductive elements are positioned substantially parallel to each other and substantially perpendicular to the at least one dielectric mismatch boundary (13, 16', Fig. 1; col. 2, lines 24-29).
8. As to claims 4, 6, and 7, Resnick discloses a system comprising:  
where the at least one dielectric mismatch boundary corresponds to a region associated with at least one first substance having a first dielectric constant and at least one second substance having a second dielectric constant (col. 2, lines 34-36).
9. As to claims 9 and 25, Resnick discloses a system further comprising:  
a processing element executing instructions to evaluate the received electromagnetic signal relative to the driven electromagnetic signal to determine a characteristic of at least one substance associated with the dielectric mismatch boundary (col. 2, lines 24-37).
10. As to claims 15 and 27, Resnick discloses a system comprising:  
where the at least one first and second conductive elements are flexible (col. 5, lines 6-10).

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11. Claims 5, 10-13, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resnick in view of Blaine as applied to claims 1 and 23, and further in view of Haynes (US Patent No. 6,801,157 and Haynes hereinafter).

Although the system disclosed by Resnick in view of Blaine, shows substantial features of the claimed invention (discussed in paragraphs above), it fails to disclose:

where the electromagnetic signal exhibits an ultra-wideband frequency [claim 5];

where the processing element communicates at least one of the attributes of the received electromagnetic signal and the characteristic of the at least one substance to a digital data processing device during a communication session [claim 10];

where the attributes of the received electromagnetic signal relative to the driven electromagnetic signal includes a time delay and the characteristic of the at least one substance corresponds to a level of that substance [claims 11, 26];

where the time delay attribute of the received electromagnetic signal relative to the driven electromagnetic signal is based, at least in part, on a time differential between signals associated with an equivalent time sampling circuit of the receiver [claim 12];

where the level corresponds to a volume of fluid in at least one of an above-ground storage tank and a below-ground storage tank [claim 13].

Nonetheless, these features are well known in the art and would have been an obvious modification of the system disclosed by Resnick in view of Blaine, as evidenced by Haynes.

Haynes discloses a system where the reflected pluses represent a characteristic of a material being measured having:

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where the electromagnetic signal exhibits an ultra-wideband frequency [claim 5] (col. 3, lines 36-39) for high speed low power measurements;

where the processing element communicates at least one of the attributes of the received electromagnetic signal and the characteristic of the at least one substance to a digital data processing device during a communication session [claim 10] (col. 4, lines 43-44) to determine the sample time of the reflected pulse;

where the attributes of the received electromagnetic signal relative to the driven electromagnetic signal includes a time delay and the characteristic of the at least one substance corresponds to a level of that substance [claims 11, 26] (col. 4, lines 31-35) to provide data to remote devices and the outside world;

where the time delay attribute of the received electromagnetic signal relative to the driven electromagnetic signal is based, at least in part, on a time differential between signals associated with an equivalent time sampling circuit of the receiver [claim 12] (col. 5, lines 35-41) to measure round trip travel time for a pulse;

where the level corresponds to a volume of fluid in at least one of an above-ground storage tank and a below-ground storage tank [claim 13] (col. 1, lines 43-45).

Given the teaching of Haynes, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Resnick in view of Blaine by employing the well known or standard features of a sensor, such as disclosed by Haynes in order to improve measuring the condition or characteristics of a material and for the purposes discussed above.

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12. Claims 14, 16-19 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resnick in view of Blaine as applied to claims 1 and 23, and further in view of Macke, Sr. et al. (US Patent Number 6,137,282 and Macke hereinafter).

Although the system disclosed by Resnick in view of Blaine, shows substantial features of the claimed invention (discussed in paragraphs above), it fails to disclose:

where the at least one first and second conductive elements form a parallel conductor transmission line structure [claim 14];

where the at least one first and second conductive elements exhibit quadrilateral cross-sections [claim 16];

where the at least one first and second conductive elements exhibit substantially identical cross-sections [claim 17];

a coupler positioned at the dielectric mismatch boundary for coupling the received electromagnetic signal, size of the received electromagnetic signal being independent of dielectric properties associated with substances forming the dielectric mismatch boundary [claims 18, 28];

where the coupler operates as an electromagnetic shunt path between the at least one first and second conductive elements [claim 19].

Macke discloses a system where the reflected pulses represent a characteristic or level of a material being measured having:

where the at least one first and second conductive elements form a parallel conductor transmission line structure [claim 14] (col. 4, lines 53-58) to provide for distance measurements;



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where the at least one first and second conductive elements exhibit quadrilateral cross-sections [claim 16] (304, 306, Fig. 4) where the cross section is taken lengthwise;

where the at least one first and second conductive elements exhibit substantially identical cross-sections [claim 17] (col. 4, lines 65-67 and col. 5, lines 1-4);

a coupler positioned at the dielectric mismatch boundary for coupling the received electromagnetic signal, size of the received electromagnetic signal being independent of dielectric properties associated with substances forming the dielectric mismatch boundary [claims 18, 28] col. 4, lines 65-67 and col. 5, lines 1-4) to couple a slight change in dielectric medium to the receiver 1 circuit;.

where the coupler operates as an electromagnetic shunt path between the at least one first and second conductive elements [claim 19] (col. 5, lines 4-8).

Given the teaching of Macke, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Resnick in view of Blaine by employing the well known or standard features of a sensor, such as disclosed by Macke in order to improve measuring the distance or characteristics of a material and for the purposes discussed above.

13. Claims 21, 22, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Resnick and Blaine in view of Mache as applied to claims 18 and 28 above, and further in view of Lutke (US Patent No. 6,229,476 B1 and Lutke hereinafter).

Although the combine teaching of Resnick, Blaine and Macke shows substantial features of the claimed invention (discussed in the paragraphs above), it fails to disclose:

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a float for positioning the coupler relative to the at least one dielectric mismatch boundary [claims 21 and 29];

where the float includes a buoyant component and a weighted component [claim 22].

In an analogous art, Lutke discloses a system for measuring liquid level having:

a float for positioning the coupler relative to the at least one dielectric mismatch boundary [claims 21 and 29] (col. 4, lines 16-26) to move along the level;

where the float includes a buoyant component and a weighted component [claim 22] (Fig. 3 and Fig. 4; col. 5, lines 7-19).

Given the teaching of Lutke, a person having ordinary skill in the art at the time of the invention would have readily recognized the desirability and advantages of modifying Resnick and Blaine in view of Macke by employing the well known or standard features of a sensor, such as disclosed by Lutke in order to improve measuring the level or characteristics of a material and for the purposes discussed above.

#### *Allowable Subject Matter*

14. Claim 20 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record fails to teach in combination a system where the coupler exhibits a length corresponding to at least one-quarter of a propagation velocity pulse length of the transmitted electromagnetic signal.

*Response to Arguments*

15. Applicant's arguments with respect to claims 1-7 and 9-29 have been considered but are moot in view of the new ground(s) of rejection.

16. In the remarks applicant argued in substance that:

(1) Resnick does not teach or suggest a transmitter operable to drive the first electromagnetic signal along the at least one first conductive element without also driving the at least second element.

17. Examiner respectfully traverses applicant's remarks:

As to point (1), Resnick in view of Blaine discloses a transmitter [col. 8, lines 2-5] operable to drive the first electromagnetic signal along the at least one first conductive element without also driving the at least one second conductive element (col. 9, lines 58-60 and col. 11, lines 32-35);

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Walter Benson whose telephone number is (571) 272-2227. The examiner can normally be reached on Mon to Fri 6:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Walter Benson *WB*  
Patent Examiner

May 27, 2005

*V. Nguyen*  
*5/31/2005*  
VINCENT Q. NGUYEN  
PRIMARY EXAMINER